magnetically switchable elements having at least four magnetic states;

a sensor disposed adjacent said rotor for carrying magnetically produced electrical pulses;

two magnets disposed adjacent said sensor to produce magnetic fields of opposite polarity along the path of travel for the plurality of magnetically switchable elements; and

wherein as said rotor is rotated, said two magnets cause each of said magnetic elements to be magnetically switched through the four magnetic states to produce two electrical pulses in the sensor for each of the magnetic elements for each revolution of the rotor.

Remarks

In response to the Office Action of July 18, 2001, the specification has been amended. The reference to number "8A" in the specification was in error, since the letter A designated a sectional view A--A. The reference in the specification to the elements in Figs. 3, 4, 5 and 6 has been amended to recited elements "1" to "9" as shown in the drawings. A Letter re Drawing Changes accompanies this Amendment and proposes a change from "8A" to --8-- in Figs. 4 and 6. Also, it was noted that the term odometer was given number 41 and number 42 in the specification. The specification has now been amended and thanks are expressed for the opportunity to correct these matters.

It was also noted that the inventor inadvertently failed to date the inventor's declaration next to his signature. Therefore, a newly executed declaration is submitted herewith.

Claims 1-6, 9-11 and 14 were rejected under 35 U.S.C. §102 (b) as being anticipated by Goossens, U.S. Pat. No. 4,721,864. The remarks in the Office Action have been carefully considered along with the claims. Based on this review, it is believed that there has been a misunderstanding of how the present invention works, or a misunderstanding of what Goossens teaches. Therefore, reconsideration of this rejection is

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respectfully requested in view of the following remarks.

Claim 1 provides as follows:

1. A pulse transducer, comprising:

a rotor having an axis of rotation and having a plurality of magnetically switchable elements spaced around its axis and rotatable and movable along a path of travel, each of said magnetically switchable elements having at least four magnetic states;

a sensor disposed adjacent said rotor for carrying magnetically produced electrical pulses;

two magnets disposed adjacent said sensor to produce magnetic fields of opposite polarity along the path of travel for the plurality of magnetically switchable elements; and

further characterized in that as said rotor is rotated, said two magnets cause each of said magnetic elements to be magnetically switched through the four magnetic states to produce two electrical pulses in the sensor for each of the magnetic elements for each revolution of the rotor.

It is respectfully submitted that Goosens does not anticipate any of the highlighted subject matter in claim 1.

First, Goosens does not provide magnetically switchable elements. Second, Goosen certainly does not provide magnetically switchable elements with four states. Third, Goossens does not cause each of said magnetic elements to be magnetically switched through four magnetic states. Fourth, Goossens does not provide two electrical pulses in the sensor for each of the magnetic elements for each revolution of the rotor.

Goossens shows a measuring wheel 1 with teeth 3. The teeth 3 themselves do not switch in any way disclosed in Goosens. As the teeth 3 rotate past the pickup assembly, they change the magnetic circuit in the air gap S1 relative to the poles shoes 10 which form a magnetic circuit with permanent magnet 9, and as the poles 3 have this effect in the air gap

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S1, they induce a voltage in coil 7. This voltage is disclosed as equal in frequency to the number of teeth 3 (col. 2, lines 50-52), however the pulse transducer is used primarily to measure revolutions of the wheel 1 rather than pulses generated by individual teeth 3. Each movement from one tooth 3 to the next tooth 3 causes one transition. There is no disclosure of four states or of magnetically switching states for any tooth 3.

Since the voltage is equal to the frequency or number of teeth in Goossens, Goossens cannot "produce two electrical pulses in the sensor for each of the magnetic elements for each revolution of the rotor." None of this happens in Goossens. It is a pulse transducer, but is otherwise not like the present claim 1 in structure or operation.

Later in the Office Action, it is said that element 6 in Goosens is the magnetically switchable element. Element 6 is in the magnetic pickup and is not in the rotor as are the magnetically switchable elements of the present invention. Element 6 is not comparable to the magnetically switched elements in the rotor.

For similar reasons, Goosens does not anticipate claim 2 either. The rotation in Goossens would not produce ten (10) pulses for five (5) magnetically switched elements. Five teeth 3 in Goosens produce at most five pulses and are not magnetically switchable, and therefore Goossens in no way anticipates or suggests the subject matter of claim 2.

Since it is believed that Goossens does not provide the magnetically switchable elements in a rotor, it further follows that it does not anticipate or render obvious the subject matter in claims 3, 4 and 5 which all further define the magnetically switchable elements in the rotor. In particular nothing in Goosens anticipates the type of element described in claim 4. It is agreed that the teeth 3 of Goosens are equally and angularly spaced around the rotor, but they are not the magnetically switched elements, meaning they change magnetic state. No passage has been cited from Goossens to support that

type of operation.

In the Office Action, claims 7 and 8 were rejected under 35 U.S.C. §103 (a) as being obvious over Goossens in view of Jerger et al. Jerger et al. provides two magnets in a rotating rotor that rotates around a single magnetically switchable pickup device referred to as a stationary probe. This does not provide a plurality of magnetically switchable elements in a rotor such that it could be suitable for use with an odometer. Thus, the function of the magnets in Jerger et al. is the opposite of the magnets in Goossens or in the present invention. The present invention, as expressed in claims 1, 7 and 8 is the only invention to provide the magnetically switched elements in the rotor.

As far as claims 13 and 15, these were rejected under 35 U.S.C. §103 (a) over Goossens in view of Evans et al., U.S. Pat. No. 4,200,785. It should now be apparent that while Goosens teaches a pulse transducer, it is not at all apparent how such a transducer would be mounted in an odometer of Evans or any other odometer. Goosens would mount its wheel parallel to one of the odometer wheels of Evans, but there would not be room for the pickup assembly of Goosens. Evans on the other hand already has a pulse transducer using permanent magnet elements which operate a reed switch. Like Goosens, Evans does not provide a plurality of magnetically switchable elements in a rotor, meaning an element that switches between two or more magnetic states in response to magnetic flux.

With respect to claim 14, this was rejected as anticipated by Goosens, Goosens does not show or suggest that its magnetic pulse assembly could be coupled to a magnetic pickup in a flow meter.

(End of this page)

Conclusion

The specification and drawings have been corrected. A newly executed declaration has been submitted. Claim 1 has been clarified. The prior art rejections are believed to incorrect for the reasons stated above. After the amendment claims 1-15 are still pending and a Notice of Allowance for these claims is respectfully requested.

Respectfully submitted,

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Appendix-Amended Claims with Changes Marked

IN THE SPECIFICATION:

Please amend the last paragraph on page 6 continuing over to page 7 as follows:

(Amended) Figs. 3 and 4 show an arrangement, where the rotor 20 of Fig. 2B is driven by a magnetic pickup 33 having north (N) and south (S) poles. The magnetic pickup 33 rotates with a magnetic driver 34 having north (N) and (S) poles, which rotates with operation of a meter movement in a flow meter 35 in response to flow represented by an arrow in Fig. 4. This magnetically coupled mechanical movement is coupled through the magnetic pickup 33 to a series of nine gears 36 mounted on respective gear shafts 37 (numbered "1" to "9" ["7", "8A" and "8B"]) in a gear mechanism, the [last] drive shaft "8[A]" carrying a capstan 39, which drives a toothed wheel 40, which in turn drives the least significant wheel 42 in an odometer 41, formed by a plurality of vertically arranged number wheels 42. The odometer 41 is preferably one of the type described in U.S. Pat. No. 5,376,776, issued December 27, 1994, and assigned to the assignee of the present invention.

Please amend the first and second full paragraphs on page 7 as follows:

(Amended) A mechanism as described in relation to Fig. 2B is mounted on a rotating shaft 43 to be rotated with magnetic pickup 33. An electrical output signal is taken from the coil 27 and transmitted to electrical circuitry (not shown) to provide electrical pulses commensurate with the mechanical output of the flow meter 35. This electrical output in Figs. 3-4 is said to be unscaled because it is provided before the gear mechanism translates the raw meter movements to the counts of the odometer 41 [42].

(Amended) Figs. 5 and 6 show a scaled version of the invention. In the scaled version, a device as shown in Fig. 2B is coupled to the gear shaft 8[A], which directly drives the capstan 39. This is the high resolution or scaled version

because the rotor 20 will be rotated by meter movements through the gear mechanism which drives the odometer [42] 41. The operation of the flow meter 35, the magnetic driver 34 and the magnetic pickup is the same as described in relation to Fig. 4.

IN THE CLAIMS:

Please amend claim 1 as follows:

1. (Amended) A pulse transducer, comprising:

a rotor having an axis of rotation and having a plurality of magnetically switchable elements spaced around its axis and rotatable and movable along a path of travel, each of said magnetically switchable elements having at least four magnetic states;

a sensor disposed adjacent said rotor for carrying magnetically produced electrical pulses;

two magnets disposed adjacent said sensor to produce magnetic fields of opposite polarity along the path of travel for the plurality of magnetically switchable elements; and

further characterized in that as said rotor is rotated, said two magnets cause each of said magnetic elements to be magnetically switched through the four magnetic states to produce two electrical pulses in the sensor for each of the magnetic elements for each revolution of the rotor.

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